## REMARKS

In response to the Office Action dated July 27, 2005, claims 23 and 37 have been amended. Therefore, claims 1-37 remain in the case. In light of the amendments and arguments set forth herein, reexamination and reconsideration of the application are requested.

### Claim Objections

The Office Action objected to claim 37 because it depends on itself. In response, the Applicants have amended claim 37 to correct this self-dependency.

### Section 102(e) Rejections

The Office Action rejected claims 1-37 under 35 U.S.C. § 102(e) as being anticipated by Fossum (U.S. Patent No. 6,606,097). The Office Action stated that Fossum discloses all the elements or features of the Applicants' claimed invention.

In response, the Applicants respectfully traverse these rejections based on the claim amendments and the legal and technical analysis below. In general, the Applicants submit that Fossum is missing at least one element or feature of the Applicants' claimed invention. In particular, as explained in detail below, Fossum does not disclose, either explicitly or implicitly, the claimed feature of converting data into a variable length fixed-point format in a normalized homogeneous coordinate system (NHCS).

#### Independent Claims 1, 10, 18, 23 and 28

Independent claim 1 of the Applicants' claimed invention includes a computer-implemented method for rendering graphics on an embedded device. The method includes inputting rendering data in a first format, and converting the rendering data from the first format into a variable length fixed-point format. In addition, the method includes processing the rendering data in the variable-length fixed-point format, and rendering the processed rendering data on the embedded device.

Independent claim 10 of the Applicants' claimed invention includes a process for rendering graphics on an embedded computing platform. The process includes inputting rendering data, and converting the rendering data into a variable-length fixed-point format including a normalized homogenous coordinate system (NHCS) for vector operations. The process further includes defining a data structure for the converted rendering data to generate converted rendering data in a NHCS fixed-point format, using a fixed-point mathematical library to process the NHCS fixed-format rendering data, and rendering the processed NHCS fixed-format rendering data on the embedded computing platform.

Independent claim 18 of the Applicants' claimed invention includes a computer-readable medium having computer-executable instructions for preparing data for rendering on a computing device. The instructions include converting the data into a variable-length fixed-point format having a normalized homogenous coordinate system (NHCS) to generate NHCS fixed-point data, and creating specialized buffers on the computing device to store the NHCS fixed-point data. The instructions also include processing the NHCS fixed-point data using a mathematical library capable of computing mathematical operations and graphics functions using a NHCS fixed-point format, and preparing the processed NHCS fixed-point data for raster by translating the NHCS fixed-point data into a language of the computing device's graphics hardware.

Amended independent claim 23 of the Applicants' claimed invention includes a method for converting a format of rendering data. The method includes inputting the rendering data in at least one of the following formats: (a) floating-point format; (b) fixed-point format, and identifying a maximum value in the rendering data. In addition, the method includes normalizing remaining values in the rendering data based on the maximum value to generate the rendering data in a normalized homogenous coordinate system (NHCS) variable length fixed-point format.

Independent claim 28 of the Applicants' claimed invention includes a graphics rendering system for an embedded computing device. The system includes a task module that inputs raw rendering data in a first format and converts the raw rendering data into a

second format that is a variable-length fixed-point format. The system further includes an application programming interface (API) module that creates buffers for storing the converted rendering data, a driver module that processes the converted rendering data to prepare the converted rendering data for rendering, and a rendering engine that renders the processed rendering data on the embedded computing device.

The Applicants' claimed invention includes converting data into a variable length fixed-point format in a normalized homogeneous coordinate system (NHCS). The fixed-point format has a variable length. Variable length means that the length can be adjusted on the fly in computing to achieve maximum resolution in computing and rendering. In other words, the length of the fixed-point format is not fixed in advance, but can be varied on the fly.

In particular, the "mathematical library and graphics functions are modified and optimized by using a variable-length fixed-point representation and a normalized homogenous coordinate system (NHCS) for vector operations. Using NHCS solves the fixed-point overflow problem. The graphics rendering system and method achieves a higher efficiency using software rendering and fixed-point NHCS representation without graphics hardware than traditional floating-point rendering with powerful graphics hardware" (specification, page 4, lines 1-8). The NHCS variable length fixed-point format "allows computations and operations to be performed on the converted rendering data such that a range can be predicted. Any data outside of the range is truncated. This processing of the data in the NHCS fixed-point format allows more efficient use of valuable memory and processing power" (specification, page 32, line 30 to page 33, line 5).

"NHCS is a type of vertex representation. NHCS can eliminate the annoying overflow, and provides a wider data space. For example, without NHCS, the model space vertex coordinates range from $2^{-16}$~$2^{15}$, assuming that a 16-bit mantissa is used. On the other hand, if NHCS is used, the model space vertex coordinates range from $2^{-31}$~$2^{31}$. By adopting NHCS it can be seen that both range and precision are greatly increased. NHCS also makes the conversion from floating-point to fixed-point easy. It

is not necessary to know the exact range of the input vertices. NHCS also eliminates the factitious overflow and takes advantage of the full storage of the buffer. Moreover, NHCS has the advantage of providing a wider data representation given the same precision. NHCS also preserves all transform and lighting (T&L) operations and makes use of the "w" in homogeneous coordinate representation" (specification, page 23, lines 16-28).

Moreover, the Applicants claimed invention can receive as input "rendering data in a floating-point format, fixed-point format, or both. The rendering data then is converted into a variable-length fixed-point format having a normalized homogenous coordinate system (NHCS). This converts the input rendering data into a NHCS fixed-point format. The NHCS fixed-point format allows computations and operations to be performed on the converted rendering data such that a range can be predicted. Any data outside of the range is truncated. This processing of the data in the NHCS fixed-point format allows more efficient use of valuable memory and processing power" (specification, page 4, lines 10-18). In other words, input data, that may be in a floating-point format, traditional fixed-point format, or both, is converted into a variable length fixed-point format in a normalized homogeneous coordinate system (NHCS).

In contrast, Fossum merely discloses a converting data from a floating point format into a fixed length fixed-point format. Specifically, Fossum discloses fixing in advance a length of the fixed-point format. Fossum discloses fixing the length of the fixed-point format to fit in an 8-bit frame buffer (col. 5, lines 43-46, lines 56-60). Thus, Fossum uses a fixed length fixed-point format, where the length is fixed in advance.

Thus, while Fossum merely discloses converting data into a fixed length fixed-point format, the Applicants' claimed invention in independent claims 1, 10, 18, 23 and 28 converts data into a variable length fixed-point format in a normalized homogeneous coordinate system (NHCS). Nowhere does Fossum disclose using the Applicants' claimed feature of converting data into a variable length fixed-point format in a normalized homogeneous coordinate system (NHCS). Because Fossum is missing at least this material claimed feature of the Applicants' claimed invention, the §102 rejection of

independent claims 1, 10, 18, 23 and 28 cannot stand.

Accordingly, the Applicants respectfully submits that independent claims 1, 10, 18, 23 and 28 are patentable under 35 U.S.C. § 102(e) over Fossum based on the amendments to claim 23 and the legal and technical arguments set forth above and below. Moreover, claims 2-9 depend from independent claim 1, claims 11-17 depend from independent claim 10, claims 19-22 depend from independent claim 18, claims 24-27 depend from amended independent claim 23, and claims 29-37 depend from amended independent claim 28 and also are patentable over Fossum (MPEP § 2143.03). The Applicants, therefore, respectfully request reexamination, reconsideration and withdrawal of the rejection of claims 1-37 under 35 U.S.C. § 102(e) as being anticipated by Fossum.

In view of the amendments and arguments set forth above the Applicants submit that claims 1-37 of the subject application are in immediate condition for allowance. The Examiner, therefore, is respectfully requested to withdraw the outstanding rejections and of claims 1-37 and to pass each of the claims to issue.

In an effort to expedite and further the prosecution of the subject application, the Applicants kindly invite the Examiner to telephone the Applicants' attorney at (805) 278-8855 if the Examiner has any comments, questions or concerns, wishes to discuss any aspect of the prosecution of this application, or desires any degree of clarification of this response.

Respectfully submitted,
Dated: October 26, 2005

Craig S. Fischer
Registration No. 42,535
Attorney for Applicants

LYON & HARR, L.L.P.

300 East Esplanade Drive, Suite 800
Oxnard, CA 93036-1274
Tel: (805) 278-8855
Fax: (805) 278-8064